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STANDARD HOSIERY LENGTHS

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# STANDARD HOSIERY LENGTHS

METHOD OF MEASURING AND STANDARDS PROPOSED FOR LADIES', MEN'S, CHILDREN'S RIBBED, CHILDREN'S SPORT, INFANTS' RIBBED, AND INFANTS' AND CHILDREN'S SOCKS

By E. M. Schenke and Charles W. Schoffstall

## ABSTRACT

A study of existing practices relating to lengths of hosiery was made. A method of measuring the length was selected, and hosiery representing the product of 30 different manufacturers was measured. From the data obtained standards are set up for the lengths of ladies', men's, children's ribbed, children's sport, infants' ribbed and infants' and children's socks. Reasonable tolerances are also recommended.

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## I. INTRODUCTION

The reduction in the variations of hosiery lengths is of economic importance to both the user and the manufacturer. The interest of the user is evident when consideration is given to the discomfort resulting from wearing hosiery, the leg of which is too long or too short. Although not relatively as important as the length of foot,<sup>1</sup> for the variation in length of an inch may not cause any decided discomfort, yet the purchaser wishes to have some reasonable assurance that the hosiery is the same length at each purchase.

The chief interest of the manufacturer is in the establishment of a fair standard as a matter of trade procedure. This must bring about fairer methods of competition. It will also decrease the number of disputes and cancellations. The saving in materials will be a factor in those instances where the manufacturer is now exceeding the proposed standards by several inches. In addition, the adoption of a regular procedure will probably increase the efficiency of the mill.

The hosiery industry has readily recognized the advantages to be gained by the adoption of a standard method of measuring the length

<sup>1</sup> See B. S. Circular No. 149, A Standardized Method of Measuring the Size of Hosiery; Feb. 1, 1924.

of hosiery and the fixing of standard lengths. Its interest has been repeatedly expressed. This work was undertaken in cooperation with the National Association of Hosiery and Underwear Manufacturers as one of the problems of research and standardization in the hosiery industry.

## II. ACKNOWLEDGMENTS

The bureau acknowledges the cooperation and efficient assistance of John Nash McCullaugh, national secretary and industrial manager of the National Association of Hosiery and Underwear Manufacturers. Mr. McCullaugh was helpful in the formulation of the plan of this study and secured through his association valuable assistance in its development. Acknowledgment is also made to the various manufacturers who submitted the hosiery used in obtaining data for the solution of this problem.

## III. PURPOSE

The purposes of this study were (*a*) to select a method for measuring the length of hosiery, and (*b*) to formulate proposed standard lengths and tolerances for men's, ladies', and children's hosiery.

## IV. METHOD OF MEASURING THE LENGTH OF HOSIERY

The selected method for measuring the length of hosiery is shown diagrammatically in Figure 1. It is as follows:

1. METHOD OF MEASURING LENGTH OF LADIES' HOSIERY.—Lay the hosiery on a flat surface. Place a ruler so that it touches the lower end of the heel gore and the curve formed at the ankle. The length is the distance from the bottom of the heel to the top of the hosiery as located by this line. (For full-fashioned hosiery this line of length shall be determined by laying the ruler so that it touches the curve at the ankle and is parallel to the front line of the hosiery.)

2. METHOD OF MEASURING MEN'S, CHILDREN'S, CHILDREN'S THREE-QUARTER LENGTH HOSIERY, INFANTS' HOSIERY, AND INFANTS' SOCKS.—Lay the hosiery (or sock) on a flat surface. Place a ruler so that it passes through the heel gore and is parallel to the ribs on the ribbed portion of the hosiery. If the hosiery has been boarded properly, the ruler will be parallel to the front line of the hosiery. If this is not so, adjust the ruler so that it is parallel to the front line of the hosiery. The length is the distance from the bottom of the heel to the top of the hosiery.

## V. DISCUSSION OF RESULTS OBTAINED

Samples of hosiery of their various kinds and styles were submitted by 30 manufacturers. These included men's, ladies', children's ribbed, children's three-quarter length (sport), infants' ribbed, and

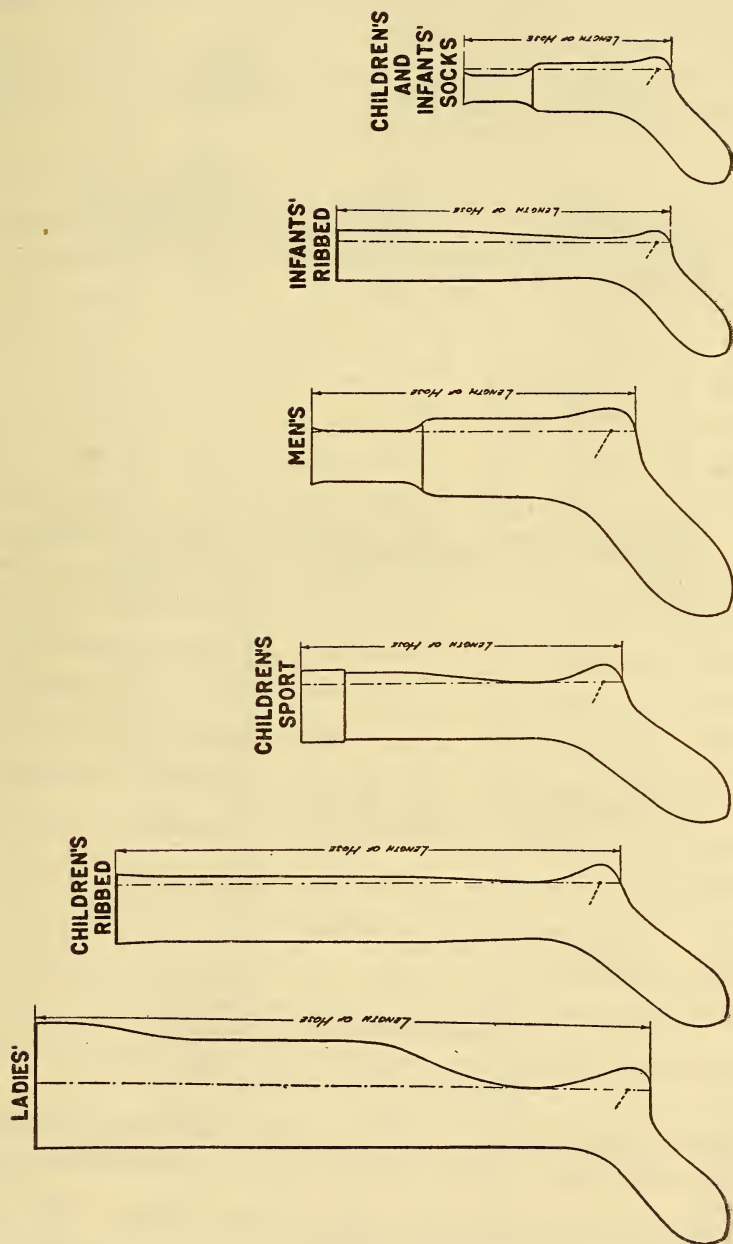


FIG. 1.—Method of measuring length of hosiery

children's and infants' socks. The kinds included cotton, silk, rayon, worsted, and various plaited combinations. It is thought that this lot of hosiery, comprising 1,200 dozen pairs, is thoroughly representative of the commercial product.

Following the methods outlined above, the lengths were measured. The results were recorded in tabular form, but for convenience of study were worked up in graphical form.

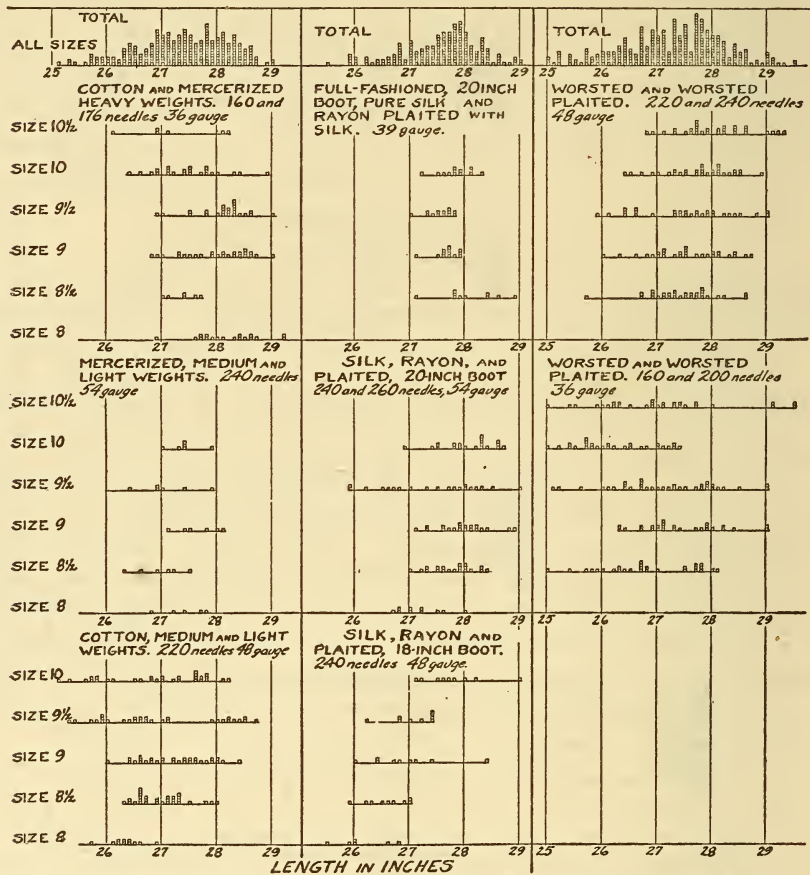


FIG. 2.—Ladies' hosiery length measurements, grouped by sizes and types in frequency of occurrence graphs

Figure 2 shows all of the results obtained on ladies' hosiery arranged by sizes and kinds. Similarly, Figure 3 shows the results for men's hosiery.

In Figure 4 the summary of these results is shown. This graph shows that ladies' hosiery are made in various lengths varying from 25 to 29½ inches, a range of 4½ inches. The results shown in Figure 2 indicate that there is very little tendency to vary the length to correspond with the size. It must be concluded then that the



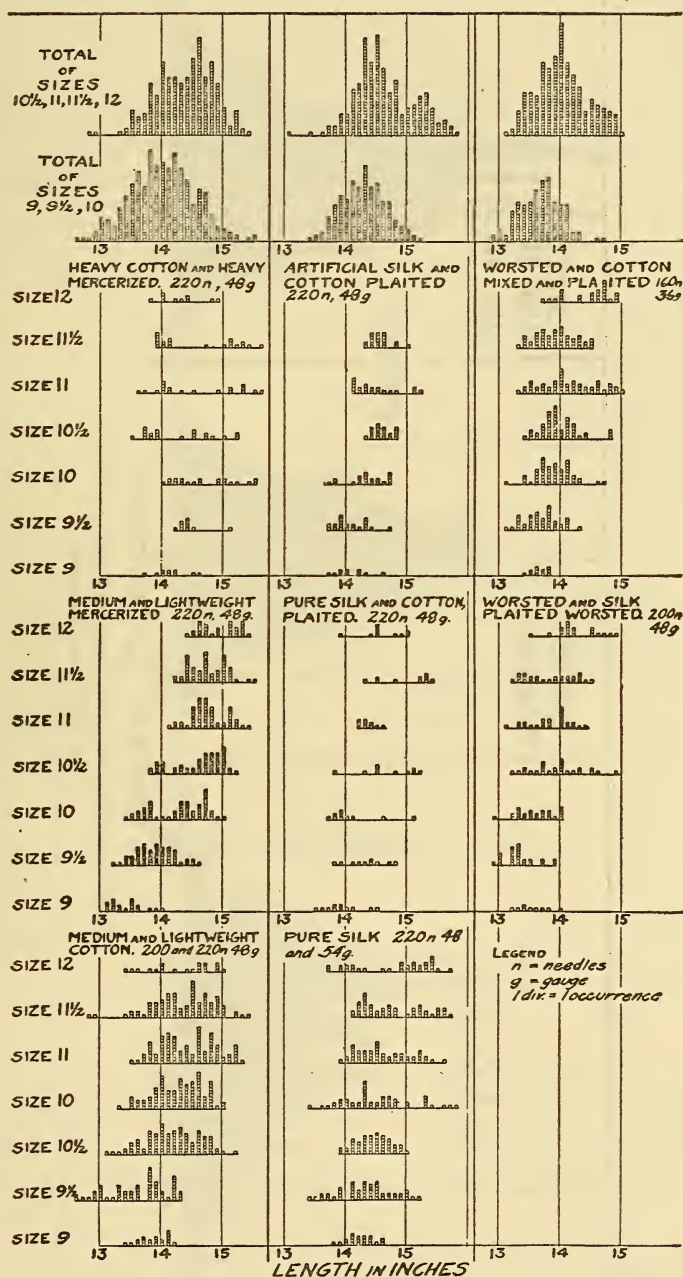


FIG. 3.—Men's hosiery length measurements, grouped by sizes and types in frequency of occurrence graphs

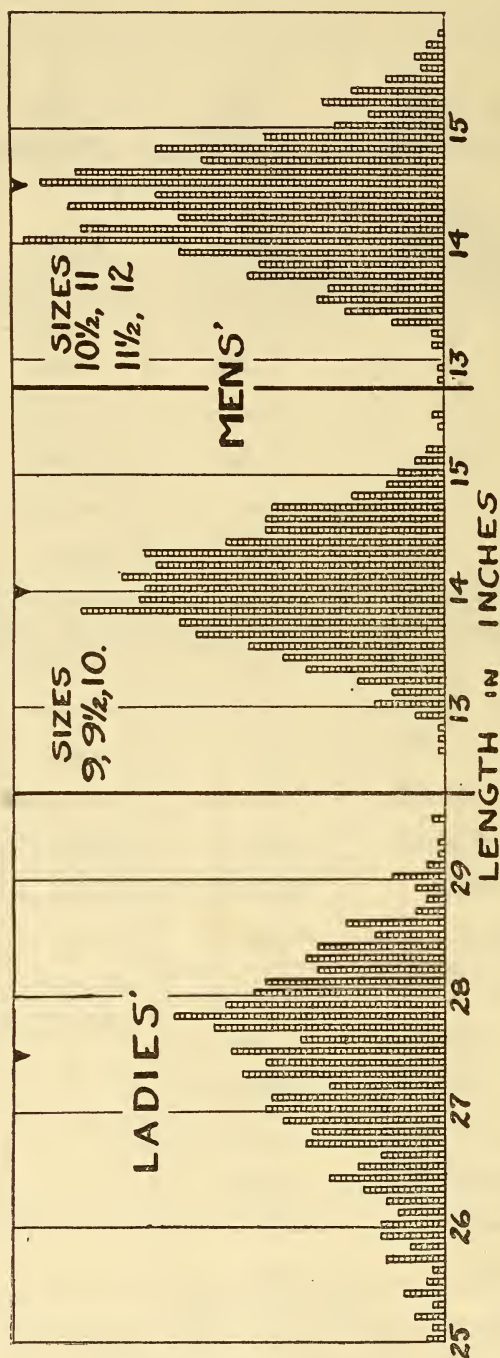


FIG. 4.—*Ladies' and men's hosiery length summaries*  
Arrowheads indicate standards

manufacturers' practice varies considerably. In men's hosiery there is some tendency to make the lower sizes shorter. This is brought out in Figure 4, where the lower sizes and higher sizes have been grouped.

Figure 5 shows the individual readings obtained on children's hosiery lengths, arranged by sizes and kinds. It is shown that although the hosiery length increases as the size increases, yet the half sizes are grouped with the full size immediately below them; that is, the lengths for size  $6\frac{1}{2}$  are about the same as those for size 6. In pre-

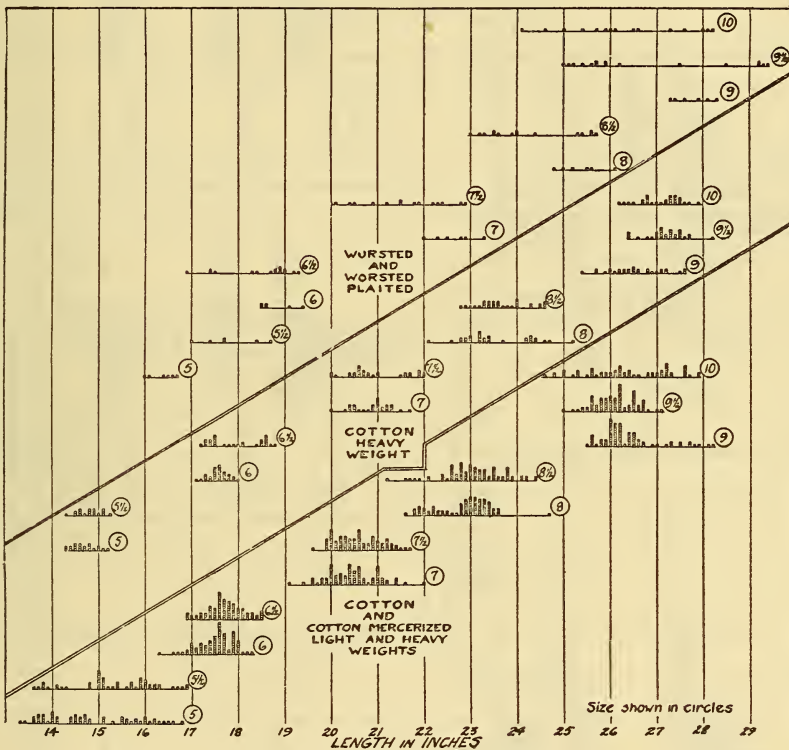


FIG. 5.—Children's ribbed hosiery length measurements, grouped by sizes and types in frequency of occurrence graphs  
Arrowheads indicate standards

paring the summary shown in Figure 6, this is taken into consideration, and the groupings are made to include the size and half size.

In Figures 7, 8, and 9 are shown results obtained on children's three-quarter length (sport), infants' hosiery, and infants' socks, respectively.

In Table 1 is shown the summary of the readings obtained. This includes the range of lengths, the mode or point of highest frequency of occurrence, and the mathematical average of the results. The proposed standards which were formulated from a consideration of these

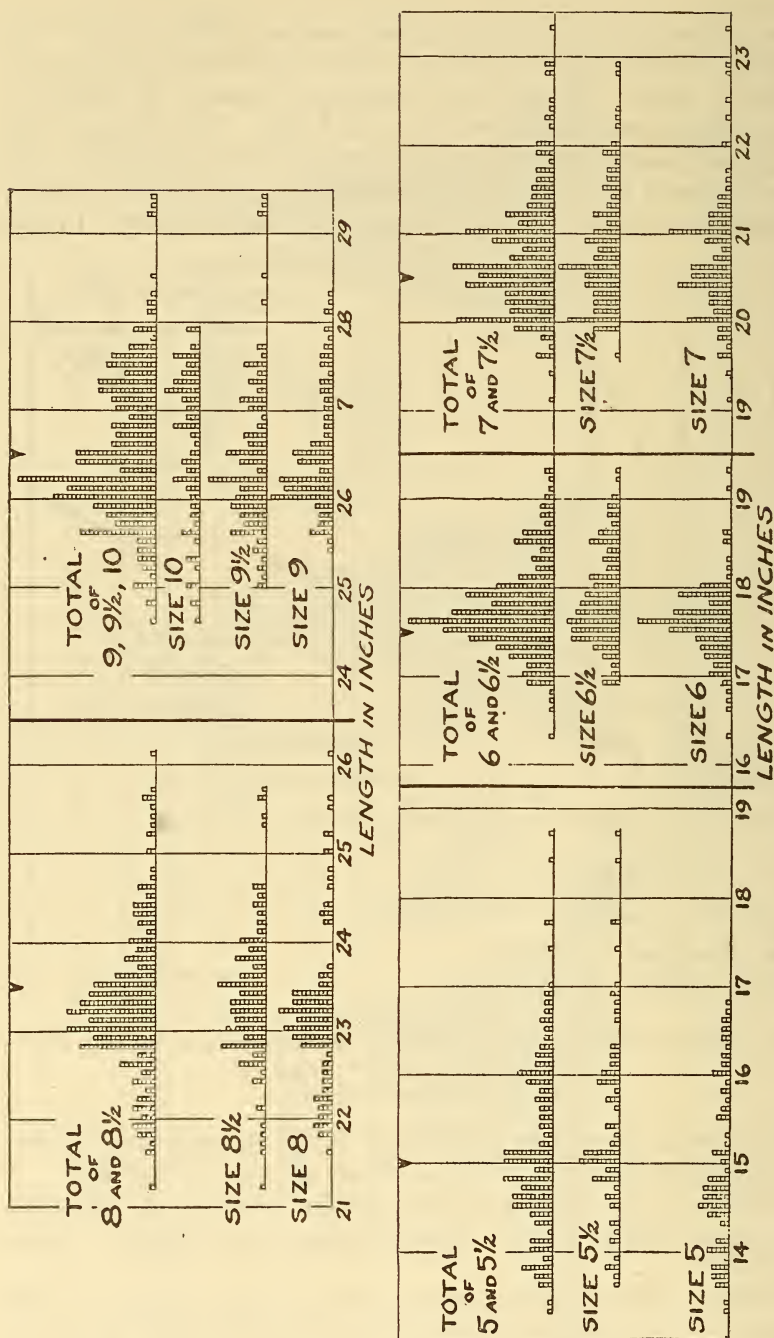


FIG. 6.—Summary of length measurements on children's ribbed hosiery, arranged in five groupings of sizes  
Arrowheads indicate standards



results are given, together with the difference between the mathematical average and the proposed standards. There is also given the increment of difference between the sizes.

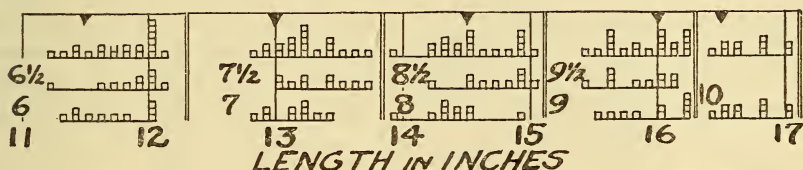


FIG. 7.—Children's ribbed three-quarter length (sport) hose measurements, grouped by sizes on frequency of occurrence graphs  
Arrowheads indicate standards

It will be noticed in considering Table 1 that most of the proposed standards are very near the mathematical average. Other interesting points are: Two lengths for men's hosiery, the lower sizes being

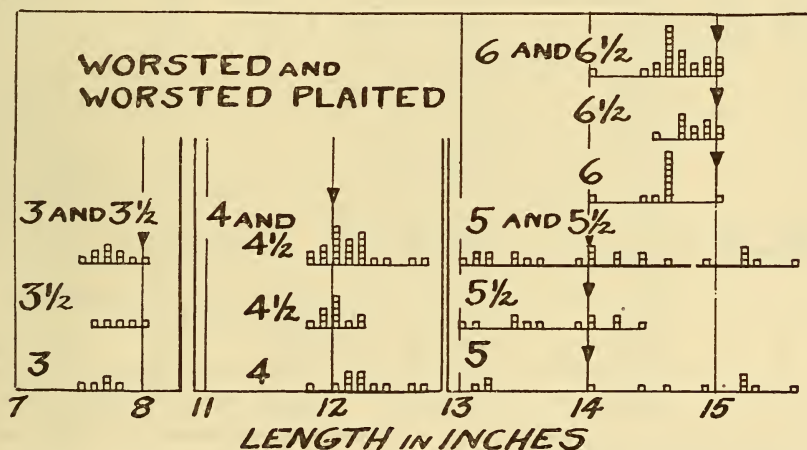


FIG. 8.—Infants' ribbed hosiery measurements, grouped by sizes on frequency of occurrence graphs  
Arrowheads indicate standards

one-half inch shorter than the higher sizes; one length for ladies'; half sizes included with the preceding full size for all children's and infants' hosiery.

TABLE 1.—Summary of results obtained on length measurements of hosiery

Kind and style	Size	Range	Mode <sup>1</sup>	Mathematical average	Proposed standards	Difference between A and B	Increment of difference
		Inches	Inches	A	B		
Ladies'-----	All-----	25.0 to 29.6	27.8	27.5	27.5	0	-----
Men's-----	9, 9½, 10-----	12.6 to 15.5	13.8	14.0	14.0	0	-----
	10½, 11, 11½, 12-----	12.8 to 15.8	14.0	14.25	14.5	0.25	½
Children's and misses' ribbed-----	5, 5½-----	13.3 to 18.7	15.0	15.4	15.0	.4	-----
	6, 6½-----	16.3 to 19.3	17.6	17.7	17.5	.2	2½
	7, 7½-----	19.1 to 23.3	20.6	20.7	20.5	.2	3
	8, 8½-----	21.2 to 26.1	23.0	23.7	23.5	.2	3
	9, 9½, 10-----	24.6 to 29.4	26.2	26.6	26.5	.1	3
Children's sport ¾ length-----	5, 6½-----	11.2 to 12.1	12.0	11.75	11.5	.25	-----
	7, 7½-----	12.8 to 13.7	13.2	12.9	13.0	.4	1½
	8, 8½-----	13.9 to 15.1	15.0	13.6	14.5	.9	1½
	9, 9½-----	15.4 to 16.2	14.6	15.9	16.0	.1	1½
	10-----	16.4 to 17.0	16.8	16.7	16.5	.2	½
Infants' ribbed-----	3, 3½-----	7.5 to 8.0	7.75	7.73	8.0	.27	-----
	4, 4½-----	11.8 to 12.8	12.0	12.1	12.0	.1	4
	5, 5½-----	13.0 to 15.6	14.0	14.0	14.0	0	2
	6, 6½-----	14.0 to 15.0	14.6	14.8	15.0	.2	1
	4-----	6.0 to 8.2	-----	7.3	-----	-----	-----
	4½-----	6.6 to 8.6	8.0	7.9	-----	-----	-----
	4, 4½-----	6.0 to 8.6	8.0	7.7	7.5	.2	-----
	5-----	6.5 to 8.6	8.1	7.9	-----	-----	-----
	5½-----	6.9 to 8.4	8.3	7.9	-----	-----	-----
	5, 5½-----	6.5 to 8.6	8.3	7.9	8.0	.1	½
	6-----	7.0 to 9.7	-----	8.6	-----	-----	-----
	6½-----	6.9 to 9.9	7.2	8.5	-----	-----	-----
	6, 6½-----	6.9 to 9.9	9.5	8.7	8.5	.2	½
	7-----	8.3 to 9.9	9.5	9.4	-----	-----	-----
	7½-----	8.5 to 10.1	9.6	9.3	-----	-----	-----
	7, 7½-----	8.3 to 10.1	9.6	9.4	9.5	.1	1
	8-----	9.2 to 10.9	10.0	10.1	-----	-----	-----
	8½-----	9.0 to 10.7	10.3	9.9	-----	-----	-----
	8, 8½-----	9.0 to 10.9	10.6	10.1	10.0	.1	½
	9-----	9.1 to 11.2	9.5	10.2	-----	-----	-----
	9½-----	9.0 to 11.6	11.2	10.7	-----	-----	-----
	9, 9½-----	9.0 to 11.6	9.5	10.4	10.5	.1	½

<sup>1</sup> Point at which the greatest number of results fall.

## VI. PROPOSED STANDARDS AND TOLERANCES FOR HOSIERY LENGTHS

Although a manufacturer may adopt a given set of hosiery lengths as standard, experience has shown that manufacturing variations will result in some deviations in the finished product. This is so even in the manufacture of delicate instruments where highly skilled experts are employed. The variation in the raw material, in the machine used, in the operation and settings of the machine will

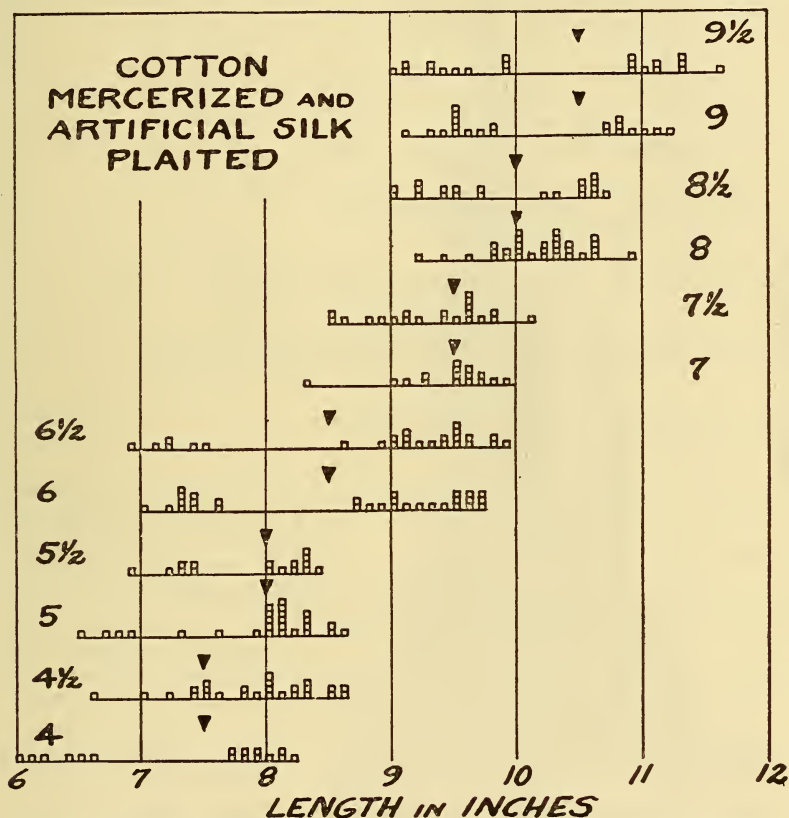


FIG. 9.—Infants' and children's sock lengths, grouped by sizes on frequency of occurrence graphs  
Arrowheads indicate standards

result, in any given mill, in variations in the finished product. The usual procedure in the establishment of a standard such as those under consideration is to study the variations as they exist and fix an allowable variation or tolerance to take care of this condition.

Each manufacturer was asked to state the intended lengths of the samples of hosiery he submitted. The differences between the intended lengths and the actual lengths may be taken as indication of the variation which would ordinarily occur in the manufacturing process. The data are shown in Figures 10, 11, and 12.

These figures show that in every instance less than 10 per cent of the hosiery are the exact length the manufacturers planned, and also that to include all of the hosiery measured a tolerance of 2.6 inches for ladies', 2.1 inches for men's and 1.7 inches for children's and infants' hosiery would be necessary. Obviously, such large tolerances would be undesirable. On the assumption that probably no very strict system had been used in maintaining any fixed length

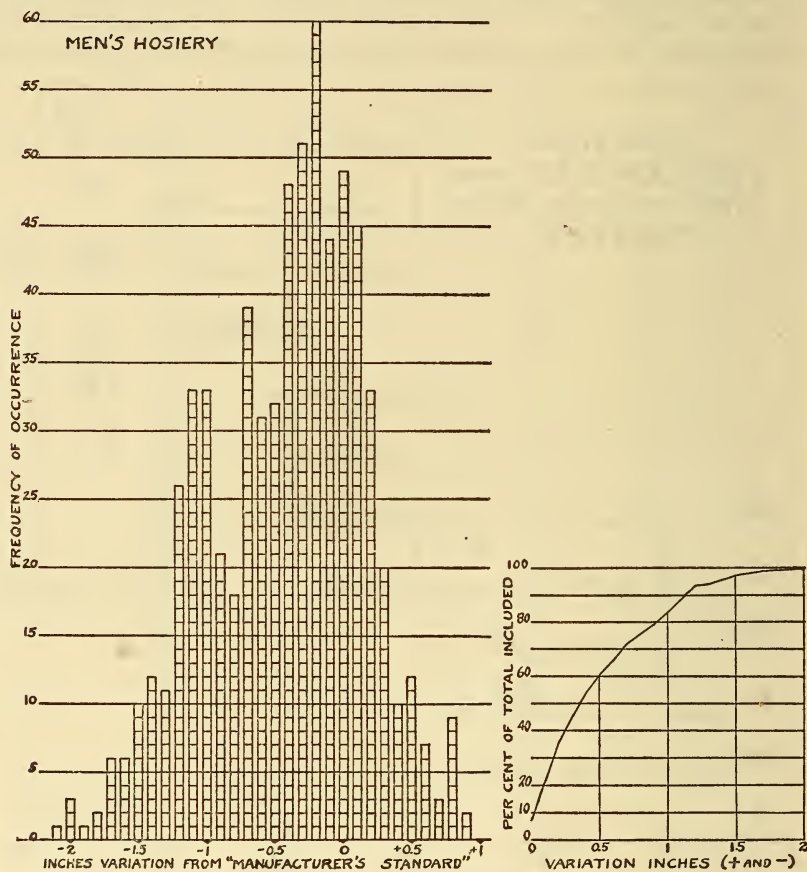


FIG. 10.—(Left) Variation of the length of men's hosiery from that given by the individual manufacturer as his standard. (Right) The percentage of all the results obtained which fall within the variations (in inches) shown

in a particular mill, it was decided to recommend a tolerance that would include roughly 60 per cent of the total.

The recommended standards and tolerances are indicated in Table 2.

These findings were recommended to the standardization committee of the National Association of Hosiery and Underwear Manufacturers. This committee, at a meeting held during January, 1926, has recommended their adoption by the association as a standard for the hosiery industry.



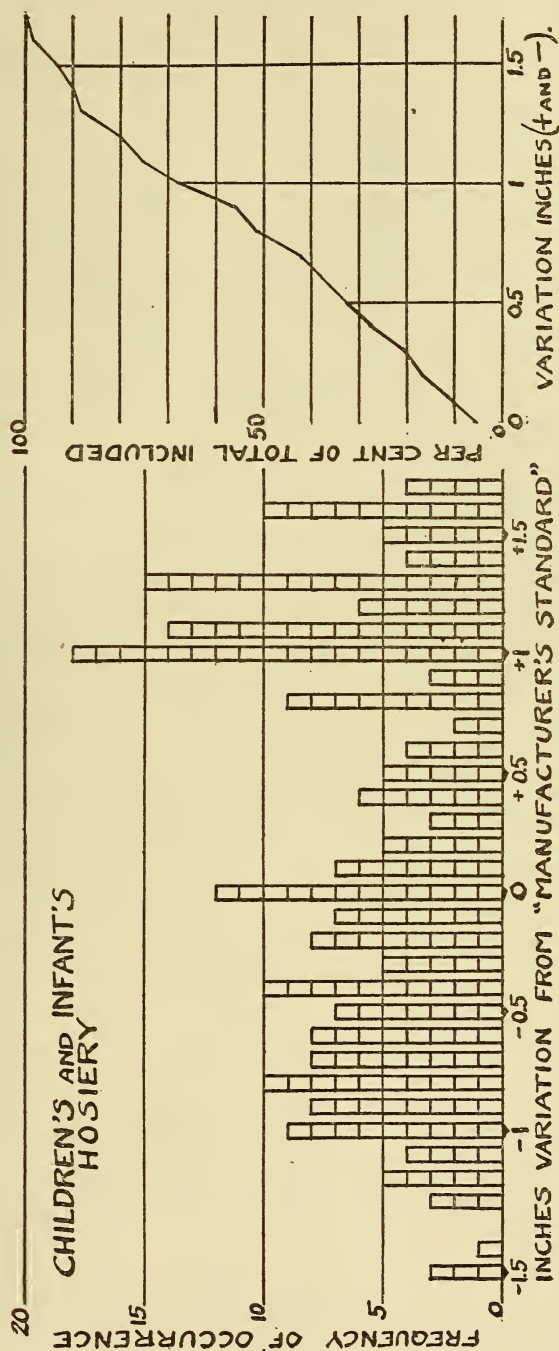


FIG. 11.—(Left) Variation of the length of children's and infants' hosiery from that given by the individual manufacturer as his standard. (Right) The percentages of all the results obtained which fall within the variations (in inches) shown

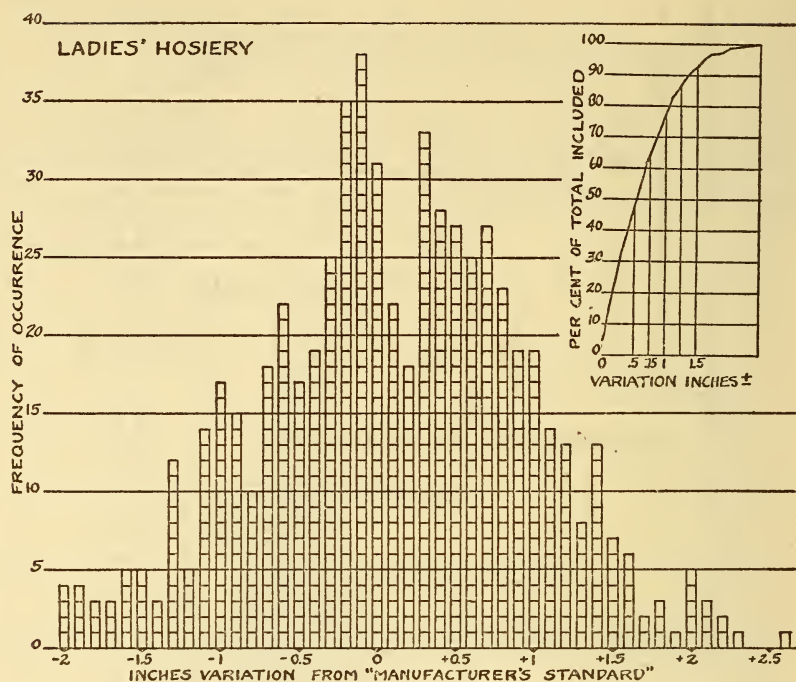


FIG. 12.—(Left) Variation of the length of ladies' hosiery from that given by the individual manufacturer as his standard. (Right) The percentages of all the results obtained which fall within the variations (in inches) shown

TABLE 2.—Proposed standards and tolerances for hosiery lengths

Kind and style	Size	Proposed standards	Tolerance (plus or minus)
		Inches	Inches
Ladies' .....	All .....	27½	1
Men's .....	9, 9½, 10 .....	14	½
	10½, 11, 11½, 12 .....	14½	
Children's and misses' ribbed .....	5, 5½ .....	15	¾
	6, 6½ .....	17½	
	7, 7½ .....	20½	
	8, 8½ .....	23½	
	9, 9½, 10 .....	26½	
Children's ribbed sport, ¾ length .....	6, 6½ .....	11½	¾
	7, 7½ .....	13	
	8, 8½ .....	14½	
	9, 9½ .....	16	
	10 .....	16½	
Infants' ribbed .....	3, 3½ .....	8	¾
	4, 4½ .....	12	
	5, 5½ .....	14	
	6, 6½ .....	15	
Infants' and children's socks .....	4, 4½ .....	7½	¾
	5, 5½ .....	8	
	6, 6½ .....	8½	
	7, 7½ .....	9½	
	8, 8½ .....	10	
	9, 9½ .....	10½	

WASHINGTON, January 27, 1926



